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THE MALE AND LARVA OF PSOROPHORA (JANTHINOSOMA) HORRIDA (DYAR AND KNAB) AND A NEW SPECIES OF PSOROPHORA FROM THE UNITED STATES (Diptera: Culicidae)

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Dyar and Knab (1908) described *Aedes horridus* from a series of 56 females taken from 7 states (Arkansas, Maryland, Mississippi, Oklahoma, Tennessee, Texas, Virginia). In 1906 these writers had described *Janthinosoma champerico* from Guatemala, a species close to *Janthinosoma lutzii* Theobald. Howard, Dyar and Knab (1917) listed *Psorophora champerico* and *Psorophora horridus* as distinct species. Felt (1904) described what he thought to be the male of *Janthinosoma lutzii* Theob., and Dyar and Knab, believing this to be the male of *P. horridus*, placed *Janthinosoma lutzii* Felt (nec. Theob.) as a synonym of *P. horridus*. They copied Felt's photograph of the genitalia. In 1928 Dyar made *horridus* a synonym of *champerico* and assumed that the male figured by Felt was the male of *Psorophora champerico* D. and K. Again Dyar's drawing was apparently copied from Felt's photograph. Matheson (1934) described a most bizarre type of genitalia for a male from Fayetteville, Arkansas of what he believed to be *Psorophora horridus* (D. and K.). Rozeboom (1939) described what he thought was the larva of *horrida* from Tulsa, Oklahoma, since reared males had genitalia similar to Matheson's Arkansas specimens. Matheson (1934) stated that "the male genitalia figured by Felt (1904) and copied by Howard, Dyar and Knab (1917) and by Dyar (1928) as representing the male of *P. horridus* is undoubtedly that of *Psorophora lutzii* Theob. or *Psorophora ferox* Humb. (*posticata* Wied.). This conclusion is in agreement with the descriptions and figures given by Bonne and Bonne-Wepster

[1] This work was done at the Fourth Service Command Medical Laboratory, Fort McPherson, Georgia. The author wishes to thank Dr. Alan Stone for his valuable suggestions, and Dr. E. A. Chapin for the use of the laboratory and specimens at the United States National Museum, Washington, D. C. Further appreciation is expressed, for their assistance, to Lt. Roy W. Chamberlain, Mrs. Edna Roth, SP–3, and Miss Winona Gilstrap, SP–3, all of the Fourth Service Command Medical Laboratory.

(1925). *Psorophora horridus* (D. and K.) should remain as a distinct species. *P. champerico* D. and K. is probably identical with *P. lutzii* Theob. but no definite conclusion should be reached until the male has been discovered. Should it prove identical with that of *P. horridus* then *horridus* would become a synonym of *champerico* D. and K."

In 1943 three males of *P. horrida*, identified by color, from Montgomery, Alabama, were received at the Fourth Service Command Medical Laboratory, and their genitalia proved to be practically identical to that of *Psorophora ferox* (Humb.). Since then a total of 21 males have been obtained, representing 5 states (Alabama, Mississippi, North Carolina, Oklahoma and South Carolina), and all agree in that their genitalia are similar to *ferox*. Apparently two distinct species of *Psorophora*, occurring in the United States, have been confused under the name *horrida*.

Matheson (1934) stated that Felt's photograph is either that of *lutzii* or *ferox*. Although the genitalia are very similar an examination shows a distinct difference in the claspers (dististyle) of the two species, that of *lutzii* being decidedly less swollen medially than *ferox*. Bonne and Bonne-Wepster (1925, Figs. 55, 56) show this in their drawings, although their descriptions merely state (for both species) that the clasper is "small at base, greatly inflated beyond the middle, extreme tip slender, recurved with an articulated spine." Gordon and Evans (1922) briefly described the genitalia of *lutzii* and stated that the sidepieces, tenth sternites and aedeagus is as in *P. posticatus* (now *P. ferox*). They did not mention the clasper. Cerqueira (1939) figures the genitalia of *lutzii* and shows that the clasper swelling is moderate. Felt's photograph, which shows the claspers clearly, is undoubtedly not *lutzii*. There are also distinctive color differences between the South American species (*champerico* and *lutzii*) and our United States *horrida* (and the new form). The chief difference is the golden- or sulphur-yellow mesonotal markings in the tropical, as compared with the white or creamy-white scales of our own species. For this reason I believe that at the moment *champerico* and *lutzii*[2] are not involved, the

Howard, Dyar and Knab (1917) write that "the only male specimen of this species [*P. horridus*] which we have had was dissected by Dr. E. P. Felt and unfortunately destroyed so that problem being to decide which of the males represents *horrida;* Matheson's type with the peculiar genitalia or the one having the *ferox*-like genitalia.

[2] After examining females of both species, I believe that *champerico* and *lutzii* are two distinct species. Not only are certain color differences present but the proboscis and palpi of *champerico* are distinctly longer than those of *lutzii*. The same relationship between the palpal segments apparently exist here, as with the two species (*horrida* and the new form) described later.

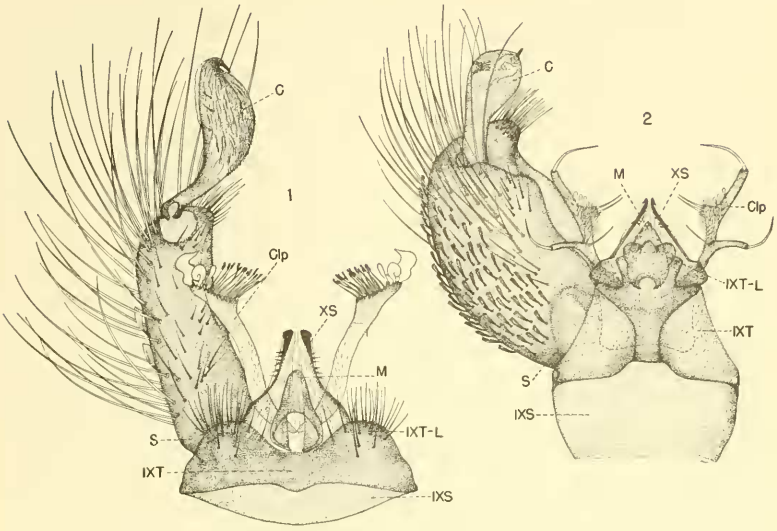


Fig. 1, Male genitalia of *Psorophora horrida* (D. and K.); Fig. 2, Male genitalia of *Psorophora longipalpis* n. sp. (drawn to smaller scale than Figure 1). *Explanation of symbols:* (C) clasper, (Clp) claspette, (M) mesosome, (IXS) ninth sternite, (IXT) ninth tergite, (IXT–L) lobe of ninth tergite, (XS) tenth sternite, (S) sidepiece.

we have been unable to prepare a description of that sex." The color differences between *horrida* and *ferox* are so distinctive that it is improbable that Felt was dealing with the latter. Since the males received from southeastern states have shown *horrida* markings and *ferox*-like genitalia, I believe that Felt's original description was actually that of a southeastern *horrida*. Unfortunately no locality data is given for his specimen.

A study of three adult males having the unusual genitalia (Arkansas, Oklahoma, South Dakota) revealed that femoral knee spots are completely lacking, while these markings are very distinct in the eastern form. The absence of knee spots also holds true for two females which were reared, by Rozeboom, with the Oklahoma male. There are other minor differences in female markings and a distinct difference in length and shape of palpi is present between the eastern and western species (in both male and female). Dyar and Knab's (1908) original description of *Aedes horridus* describes the legs as "deep violet scaled, the basal two-thirds of the femora yellowish, the knees silvery white . . ." In 1917 they again described the knees of *P. horridus* as being narrowly silvery white-scaled.

Of the original 56 female specimens (Cotype No. 11999) used by Dyar and Knab, 41 were available at the United States

National Museum. An examination of these cotypes showed that both species were represented although the majority of them were the eastern form. Thirty-four specimens agreed with the original description while 7 (all from Texas) lacked knee spots and were similar in other characters to the Oklahoma females. Apparently the original description of *horrida* was based mainly on eastern material and therefore a lectotype (Corinth, Mississippi, VIII–14–04, Coll. H. S. Barber) agreeing with that description was selected from the cotypes.

The genitalia figured by Felt (1904) is assumed to be that of *Psorophora horrida* (D. and K.) (Fig. 1). Matheson's male (Fig. 2) therefore represents a new species and this midwestern form which has been confused with *horrida* is now named *Psorophora longipalpis*. Rozeboom's (1939) "*horrida*" larva also becomes a synonym of *longipalpis*.

The maxillary palpi project from beneath the clypeus and according to Snodgrass (1943) each consists of four segments in female mosquitoes. When the head is cleared in KOH and mounted on a slide, the female palpus (of *horrida* and *longipalpis*) show the first two segments small and almost completely fused, the junction being indicated by a slight constriction and also by a break in pigmentation. The second and third segments appear partly fused also but the joint here is more distinct than that between the preceding segments. The fourth segment articulates freely with the third. In the present description the female palpus is regarded as composed of four segments in spite of the fact that some specimens possess a small setose projection at the tip of the fourth segment (Figs. 8, 16). This structure may represent a sensory organ or possibly a fifth segment since Marshall (1938) states that the palpus is composed of five segments. In unmounted specimens (i. e. those not cleared in KOH) the dense covering of scales and setae obscures most of the palpal joints so that segments one and two may appear as a single segment. However, the joints between segments two and three, and three and four are distinct and the terminal segment can be easily separated from the preceding ones. The small projection at the tip of the fourth segment, when present, doesn't influence the length of the palp since it is hidden by the overlapping scales.

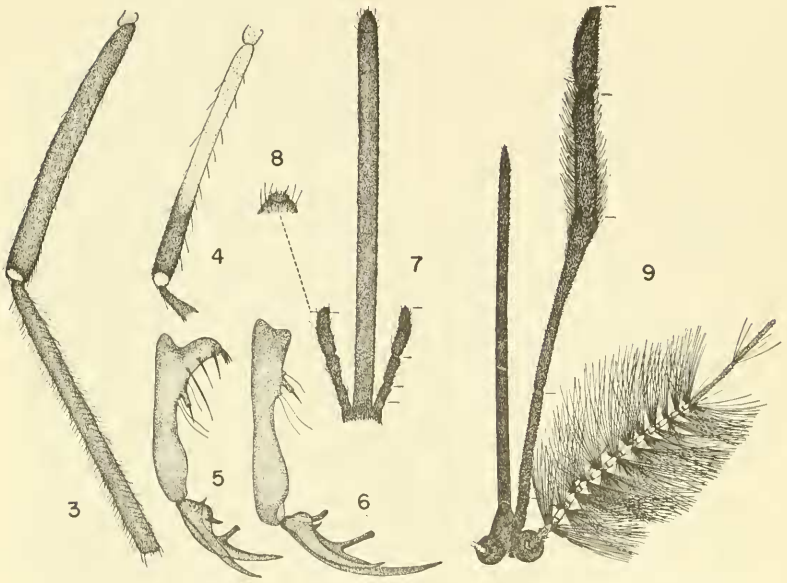
Edwards (1941) regarded the male palpus as composed of three segments, neglecting the rudimentary basal segment and the incomplete division of the shaft (segments two and three) into two segments. In the present study, the male palpus is considered composed of five segments. These are a small basal segment articulating more or less freely with two elongated segments that are practically completely fused, their joint being indicated by a small nude (without scales), slightly distorted area; and freely articulating penultimate (fourth) and terminal (fifth) segments.

Psorophora (Janthinosoma) horrida (D. & K.)

Aedes horridus Dyar and Knab, 1908, Proc.U. S. Nat. Mus. 35:56 (in part).
Psorophora horridus (Dyar and Knab): Howard, Dyar and Knab, 1917, Mosq. No. and Cent. Amer. and W. I., 2:561 (in part).
Psorophora (*Janthinosoma*) *horridus* (Dyar and Knab): Dyar, 1922, Proc. U. S. Nat. Mus., 62:36 (in part).

Male.—Head: Proboscis uniformly dark scaled, long, almost equal in width throughout. Palpi (Fig. 9) longer than proboscis, with dark appressed scales, some of these roughened; integument of joint between second and third segments dark [3]; last two palpal segments distinctly broader than the preceding ones, the penultimate segment with long black bristles. Antennae (Fig. 9) reaching to about the apex of the third palpal segment or a little beyond; last two antennal segments short, both not as long as the combined preceding segments; hairs of whorls very numerous and long; tori black, globose and bare. Clypeus black, nude. Vertex clothed with broad recumbent whitish scales, some lanceolate ones in the occipital region, and many erect forked dark (very few pale) scales; recumbent scales along the margin of eye, broad and pale; ocular and vertical setae long and black, frontal setae pale. *Thorax:* Mesonotum with a broad median band of bronzy dark narrow scales and short bristles; sides with very broad, flat white scales (some creamy scales along the dividing line of median dark band and lateral white scales) and long, mostly dark, setae; a few long narrow white scales intermixed with the broad ones at the posterior third of the mesonotum; some medial broad white scales surrounding the antescutellar area. Scutellum trilobate, clothed with pale scales, the lobes with long black bristles. Pleural sclerites sparsely scaled, otherwise without significant differences from that described later for the female. *Legs:—Prothoracic leg*—coxa with a patch of white scales,with or without a few apical dark scales; outer surface of femur with some yellow scales basally, the remainder violet-scaled, inner surface with violet scales at the apical fourth remainder yellowish; white femoral knee spot present; tibia and tarsus with dark appressed scales and some short suberect bristles; last tarsal segment (Fig. 5) scaled and setose, narrowed medially, with a basal projection, along the posterior margin, bearing several short and long spines; at least one elongated papillary projection, slightly before the middle along the posterior margin, bearing a short bristle; some long hairs from enlarged tubercles, near the papilla; large tarsal claw with a small basal tooth and a longer medial one (apex of tooth rounded or slightly enlarged); smaller tarsal claw with a small acute tooth near the base. *Mesothoracic leg* (Fig. 3)—coxa with a patch of white scales, with or without a few

[3] In *ferox* males, the junction between palpal segments two and three is very distinct because the color of the integument of this nude area is decidedly paler (creamy white) than the rest of the palpal integument. The joint actually appears as a pale ring. In *horrida* males the color of the integument is the same for the entire length of the palp and therefore the joint between segments two and three is very indistinct. Since the genitalia of these two species are very similar, the color of the integument in this region is a good diagnostic character particularly in badly damaged specimens which have lost their distinctive color markings.



Figs. 3–9, *Psorophora horrida* (D. and K.) adult characters. 3, Femur (with knee spot) and tibia (with long setae) of mesothoracic leg of male; 4, Femur (with knee spot) of metathoracic leg of female; 5, Last tarsal segment and tarsal claws of prothoracic leg of male (scales and majority of setae not indicated); 6, Last tarsal segment and tarsal claws of mesothoracic leg of male (scales and majority of setae not indicated); 7, Palpi and proboscis of female; 8, Tip of fourth palpal segment (greatly enlarged) of female; 9, Antenna, proboscis and palp of male.

apical dark scales; femur violet-scaled on outer surface, inner with yellow scales extending to apical third, remainder dark-scaled; white femoral knee spot present tibia with dark appressed scales and numerous long outstanding suberect setae; tarsus with dark appressed scales and sparse short bristles; last tarsal segment (Fig. 6) scaled and setose, narrowed medially; at least one long papillary project tion bearing a bristle, before the middle along the posterior margin; several long hairs from enlarged tubercles around the projection; large tarsal claw with a short basal spine (apically rounded) and a longer medial tooth, usually roundly truncate or slightly enlarged at the tip; smaller tarsal claw with a short basal tooth. *Metathoracic leg*—coxa with a basal patch of white scales; femur with about the basal half of the inner and outer surfaces yellow-scaled, remainder violet; white femoral knee spots present; tibia with roughened suberect dark scales and numerous long setae; tarsus with short suberect setae and roughened scales on the first two segments, the last two segments and sometimes the tip of the third white-scaled, remainder dark-scaled; last tarsal segment without papillary projections, not narrowed medially; both tarsal claws small, about the same size, each with a medial pointed tooth. *Abdomen:*—dorsum of first segment yellow-scaled the others with violet-blue scales and some apical lateral

patches of white or creamy scales; sternites with pale scaling restricted mostly to the apical portion and violet scales to the basal part of the segment; eighth sternite all dark-scaled.

Male Hypopygium (Fig. I):—*Sidepiece* (*Basistyle*) about three times as long as wide, roundly truncate at the apex, inner apical margin with a slight rounded projection bearing a group of setae; surface of sidepiece, with microtrichia, scaled and bearing long stout and short slender setae. *Clasper* (*Dististyle*) expanded medially to more than twice the width at the base (from side), constricted apically and bearing a short stout retrorse terminal spine; surface rugose, with a few setae from round openings; inner portion bearing microtrichia, outer apical margin with a thin clear membranous area. *Claspette* slender, well separated from the sidepiece; apical portion bent laterad and bearing three flattened appendages at the apex, one of these short and rounded, the other two, large, curled, contorted and acute leaflets; numerous apical marginal and submarginal slender, distally feathered setae. *Lobes of ninth tergite* connected by a broad sclerotized band, each lobe mound-like, covered with fine microtrichia and bearing numerous long slender setae from distinct tubercles. *Ninth sternite* with a group of setae, medially on the posterior margin. *Tenth sternite* (*Paraproct*) membranous, spicular, supported by two sclerotized strips bearing one or more small denticles apically; several small setae occur on the subapical region. *Mesosome* (*Phallosome*) open ventrally and closed on the dorso-apical half; basal portion wide, the part beyond the middle tapering towards the apex.

(In non-flattened specimens the apical portion of the claspette with its setae are curved upwards in a dorsal direction showing the feathered tips of the appendages. In this position the claspettes of *horrida* appear somewhat shorter than those in *ferox* and usually the tip of the apical contorted leaflet (in *horrida*) does not reach the hollow region, on the sidepiece, which holds the clasper. However when the specimen is flattened under a cover slip the setae can be clearly seen from the side, the claspette is somewhat elongated and the distal curled leaflet may reach the apical hollow or go beyond. In non-flattened specimens of *ferox* the claspette appears to be longer and have less of a dorsal curvature, while the distal contorted leaflet usually reaches, or goes beyond, the base of the apical hollow on the sidepiece. In some specimens this leaflet may actually reach the apex of the sidepiece itself. However these differences are probably subject to variation and cannot be used to safely separate the genitalia of *ferox* from *horrida*.)

Female:—Head: Proboscis long, slender of uniform width throughout, labellae long and conical, uniformly dark-scaled. Palpi (Fig. 7) short, the dark scales and setae giving a roughened appearance; segment four about equal in length, or only a little longer than the first three combined, its sides usually gently curved, base slightly constricted and apex roundly tapered (clearly seen in KOH treated specimens); tip of fourth segment sometimes with a small knob-like projection. Antennae slender, segments pilose, hairs of whorls sparse and long; tori globose with a patch of pale broad scales on the inner surface. Vertex with broad appressed white to creamy scales, some narrow ones on occipital region and a patch of flat broad violet black ones on each side; forked erect scales mostly yellowish, a few dark ones near the patch of flat dark scales; ocular and vertical setae mostly dark, frontal setae pale; scales along margins of eyes

pale, mostly broad. *Thorax:* Mesonotum with a broad median band of dark narrow scales and short dark bristles; sides of disc with broad white to yellowish-white scales and long and short dark and pale setae; some broad white to yellowish-white scales surrounding the antescutellar area. Scutellum trilobate, pale-scaled. Anterior and posterior pronotal lobes and postspiracular plate with numerous broad white scales and pale and dark setae; subspiracular area nude or nearly so; propleural plate with broad white scales; sternopleural and mesepimeral plates with nude apical regions, the remainder covered with broad recumbent white scales; meron, nude and dark. *Legs: Prothoracic leg:*—Integument of coxa pale, with a dense patch of white scales and with or without a few dark ones apically; outer surface of femur mostly violet-scaled with some yellowish scales near the base, inner surface with violet scales at the apical third, the remainder yellowish; white femoral knee spots present; tibia and tarsus with dark appressed scales and some short suberect setae. *Mesothoracic leg:*—Integument of coxa darker than fore or hind coxa with a patch of scales similar to that on the fore coxa; femur violet-scaled on the outer surface, inner with yellowish scales extending to the apical third; white femoral knee spot present; tibia and tarsus with dark appressed scales and short suberect setae. *Metathoracic leg:*—Integument of coxa pale, with a basal patch of white scales; femur with a little more than the basal half of the inner and outer surfaces yellowish-scaled, remainder violet; white femoral knee spot present (Fig. 4); tibia with dark appressed slightly roughened scales and short suberect setae; last two tarsal segments white-scaled, the others dark; scales on first two segments roughened. The amount of yellow scales on the femur is somewhat variable as is the scaling of the hind tarsal segments. Usually the white scales (with an occasional dark scale) are restricted to the last two tarsal segments only, although specimens are found with the apex of the third segment white. Sometimes the fourth segment will have some dark scales in definite patterns as follows: (a) dark scales on base and apex of the ventral surface, with or without a few medial dark scales; (b) entirely dark-scaled, or nearly so, on one side only (dorsal or ventral); (c) entirely dark, or nearly so, ventrally, and partly dark-scaled dorsally; (d) dark-scaled on apical ventral half or third; (e) dark-scaled on both dorsal and ventral apical half; (f) almost entirely dark-scaled (very few white scales); (g) almost entirely dark-scaled; fifth segment with some dark scales; (h) almost entirely dark-scaled ventrally and dark-scaled basally and apically on the dorsal surface; fifth with dark basal and apical rings. (a and b are not uncommon while the others occur rarely). *Abdomen:*—Dorsum of first segment pale-scaled, remainder mostly violet-scaled; segments two to six (sometimes seven) with patches of pale lateral apical scales, the patches larger on the posterior segments; sternites of segments one to three almost entirely yellow, segments four to six with dark scales basally and yellow scales apically, the seventh segment almost entirely violet-scaled.

Larva (Fig. 10):—Head wider than long, bulging laterally. Antennae spinulate, slightly curved, gradually tapering distally, shorter than (rarely as long as) head; a small multiple tuft (7 or more branches) just beyond the middle usually not reaching the apex of the antenna; 1 short and 3 long spines at the tip. Lower head hairs usually triple, sometimes double; upper head hairs double or triple; head hairs short, with branches all about the same diameter and length,

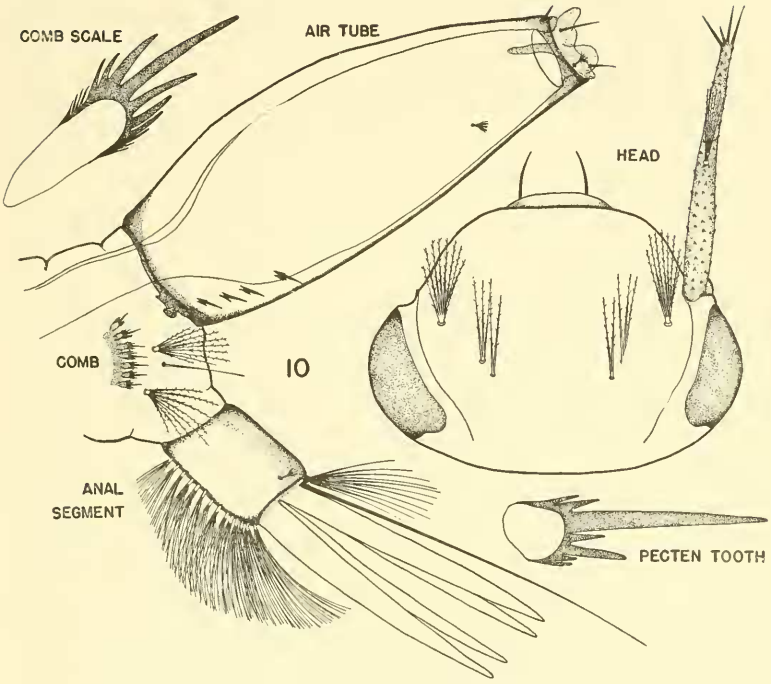


Fig. 10, *Psorophora horrida* (D. and K.) fourth instar larval characters.

usually reaching about the middle of the preantennal tuft, or a little beyond the base of the antenna, never beyond the preclypeus. Preantennal tuft with 5 or more branches (usually more than 7) and generally not reaching beyond the preclypeus. Antennal, preantennal and head hairs finely frayed.

Lateral abdominal hairs longer on first two segments than on succeeding segments (these are small and often difficult to see on segments IV to VII); multiple on segments I and II; usually 3, sometimes 4 branched on segments III to VI (rarely single on segment VI); 2 or 3 branched on segment VII.

Comb scales of eighth abdominal segment usually 7, but from 5 to 8 in number (variable on either side of the same specimen and sometimes in a partial double row), arising from the posterior margin of a weakly sclerotized plate. Individual comb scale with a large central spine and several smaller ones on each side. A single simple hair arises between two multiple tufts (branches frayed) posterior to the lateral comb.

Air tube inflated, generally more than three times as long as wide at the base. Usually 5, but from 2 to 8 pecten teeth (variable on either side of the same specimen) arise basally; the apical pecten teeth often with several smaller spinules at the base; however, the number of these basal spinules on each pecten tooth is variable. A minute multiple ventral tuft, whose branches are usually smaller than the length of a pecten tooth, arises ventro-laterally on the apical third.

Dorsal preapical spine about one-half to two-thirds the length of a pecten tooth. Dorsal apical hair about one and one-half to two times longer than the dorsal preapical spine; other apical hairs (ventral) short, one pair single the other with several fine branches a short distance from the base.

Anal segment longer than wide, ringed by plate; ventral brush consisting usually of 14 tufts (sometimes 15, rarely 13 or 16 tufts) which perforate the plate along the mid-ventral line; dorsal brush a long hair and a multiple tuft on each side; lateral hair small and multiple, branched a short distance from the base; 4 tapering anal gills, longer than the anal segment.

Lieutenant Charles B. Eaton has reared *horrida* and recorded data on the biology of this species. The larval description is based on material kindly supplied by him. The information concerning the habits of *horrida*, given in the following paragraphs, is taken practically verbatim from a personal letter of Lt. Eaton's, dated October 12, 1944.

Collections of *P. horrida* on the Fort Benning Reservation have been made at intervals during the last two years. The species was first taken on June 22, 1943, and again on July 1 and 10 of the same year. During 1944 the species has been collected, on several occasions, in a locality which is the only natural breeding site thus far discovered for *horrida* on the reservation. This site is located in the Alabama Area, State of Alabama, immediately northeast of the Alabama Landing Strip, and about a mile southwest of the Chattahoochee River, at a point which marks the boundary between the states of Georgia and Alabama. While the species may be present in other parts of Fort Benning, records of some 15,000 mosquitoes collected at this military installation during 1943 and 1944 fail to indicate its occurrence outside the Alabama Area.

P. horrida breeds locally in temporary pools, that exist under cover of partial shade, following prolonged rains. The breeding site dries out completely and remains dry for several weeks at intervals throughout the year. However, when the area is flooded after these dry periods, the eggs hatch and the larvae seem to develop with great rapidity. The adults emerge in large numbers. Collection records indicate that the great majority of a given generation of *horrida* emerge almost simultaneously. Once an emergence has occurred it is almost impossible to find larvae of the species, even when the breeding places are not completely dried up. The adult females rest on low vegetation, close to the ground. When disturbed they swarm hungrily upward on the intruder and lose no time in biting. The duration of the adult stage under natural conditions is not definitely known but field collection records indicate that the life span of the females is probably about a month. In the first emergence that occurred this season *horrida* females began to appear in numbers about May 10, and disappeared in

mid-June. Following the second emergence, which began about August 15 the females were numerous until the second week in September. Nothing is known of the life span of the males, but presumably it is of short duration.

Adults are commonly associated with the following other species: *Psorophora ferox*, *P. varipes*, *P. cyanescens*, *P. ciliata*, *Aedes vexans*, *A. mitchellae*, *A. dupreei*, *A. sticticus*, and *A. atlanticus or tormentor*. The foregoing records are based on collections, at the breeding site (*horrida*), of adults made simultaneously with collections of *P. horrida* as the mosquitoes alighted on the body or clothing of the collector. The determination of species associated in the larval stage with *P. horrida* has been hampered by the confusion existing in the separation of this species and *P. ferox;* however, larvae of *Aedes vexans*, *A. atlanticus*, *A. dupreei*, and *P. ferox* have been collected in association with larvae subsequently determined as *horrida*.

Since larvae of *horrida* proved to be difficult to collect in their native habitat, an attempt was made to rear them from the egg stage. Following the emergence that occurred in mid-August little difficulty was experienced in finding females to provide the eggs. On August 21, approximately 35 females were captured and transported to the laboratory where they were confined in groups of 3 to 6 in pint jars covered with cheese cloth. About an inch of moist sand was placed in the bottom of each jar to provide a site for egg deposition. Prior to the initial confinement each mosquito was allowed to feed to repletion on human blood. Few of the mosquitoes appeared to have fed before and nearly all took blood readily. Throughout their confinement the females were allowed to feed on humans every 2 or 3 days. The maximum number of blood meals taken by any one female was 9, and the minimum number 4. The average length of survival of the adult females after being caged was 9½ days, with a maximum of 16 days and a minimum of 2 days.

Since no males were present in the collection, fertilization of the females presumably took place in the field prior to their capture. A number of females died in the cages before egg deposition began, and it may be that these females had not mated. Oviposition was observed on several occasions. In some cases the eggs were strewn out on the surface of the soil, but usually they were tucked away in tiny crevices behind particles of soil about 1 mm. from the surface, where they were invisible from above. The newly laid eggs are creamy-white in color but become black in a short time, and seem to be sticky. Hatching of the eggs seems to be stimulated by a previous drying period. In a rearing jar flooded 2 days after oviposition began, tiny larvae were not observed until 6 days after the water had been added. In other jars not flooded immediately

larvae appeared, in several instances, within 15 minutes after flooding.

The larvae of *horrida* are bottom feeders, but just what their natural food consists of could not be determined. In the laboratory, pulverized dog biscuit and a yeast suspension were supplied for food. Larvae developed to the fourth instar on this diet with reasonable success; however, these mature larvae were not particularly robust individuals, and a large percentage were unable to pupate successfully. Under the conditions of the study there was a wide range in the length of time spent in the larval stage. The shortest period required for development from egg to pupa was 8 days, while the longest period was 18 days. The number of individuals to successfully reach the pupal stage was not sufficient to furnish a valid average. As noted above, however, field collections indicate that the range in development time is much narrower than the rearings indicate and it is probable that most of the larvae pupate within 7 days or less in their native habitat.

A total of 9 *P. horrida* adults, with associated larval skins, have been reared through from the egg stage at this writing. Of this number 6 were males and 3 were females. The length of the pupal period varied from 1 to 3 days in these rearings, with most of the adults emerging within 2 days.

The male records of *Psorophora horrida* are listed below: Alabama: Maxwell Field, Montgomery, V–6, 8–43 (light Trap) 3; Alabama Area of the Fort Benning Reservation (northeast of Alabama Landing Strip and about a mile southwest of the Chattahoochee River at a point which marks the boundary between the states of Georgia and Alabama), V–3–44 (C. B. Eaton) 4 (reared from larvae); IX–12, 13, 14, 16, 21–44; X–4–44 (C. B. Eaton) 6 (reared from eggs); Mississippi: Camp Shelby, Hattiesburg, V–25–44 (C. D. Michener) 1; North Carolina: Camp Sutton, Monroe, VII–26–43, 1. Oklahoma: Dawson, Tulsa Co., V–15–44, 5. South Carolina: Myrtle Beach Bombing Range, Horry Co., VIII–16–43 (light Trap), 1.

Female specimens of *P. horrida* have been examined from the following localities [4] (specimens received at the Fourth Service Command Medical Laboratory, and those borrowed from the Seventh Service Command Laboratory, Fort Omaha, Nebraska; Dr. Robert Matheson, Cornell University; Dr. H. B. Hungerford, University of Kansas; and Dr. F. A. Fenton, Oklahoma, A. and M. College). Alabama: Town Creek; Mobile; Selma; Gadsden; Montgomery; Tuskegee; Florence; Alabama Area of

[4] *Horrida* females have been taken fairly commonly throughout the southeastern states; only towns or counties are listed, and no collection data is given for the numerous specimens examined.

the Fort Benning Reservation. ARKANSAS: Little Rock (1) [5]; Fort Smith (2); Helena (1); Danville (2); Vanburen (2); Strong; Scott. DISTRICT OF COLUMBIA: Washington. GEORGIA: Macon; Welleston; Augusta; Rome; Fort Oglethorpe. ILLINOIS: Elizabeth. INDIANA: Lafayette. IOWA: Algona; Folletts, Clinton Co. KANSAS: Coffeyville; Fort Riley; Independence; Junction City; Lawrence. KENTUCKY: Meade Co. LOUISIANA: Baton Rouge. MARYLAND: Plummers Island (1). MISSISSIPPI: Aberdeen; Corinth (2; one of these is designated as the lectotype); Jackson (2); Westpoint (1); Grenada; Meridian; Hattiesburg; Biloxi; Columbus; Greenwood; Clinton; Centerville. MISSOURI: Charleston, Mississippi Co.; Jefferson Barracks; Rosecrans Field, Buchanan Co. NORTH CAROLINA: Monroe; Fayetteville; Maxton; Rockingham; Goldsboro. OHIO: Marion County. OKLAHOMA: Wister (3); Sherwood; Gore; Eagletown. SOUTH CAROLINA: Columbia; Sumter; Horry Co. TENNESSEE: Rives (3); Chattanooga (1). TEXAS: Denison (1); Dallas (8); Greenville (3); Kirbyville. VIRGINIA: Woodstock (1).

Larval specimens of *Psorophora horrida* have been examined from: ALABAMA: Alabama Area of the Fort Benning Reservation, IX–16–44 (C. B. Eaton) 36 (reared from eggs); IX–9, 10, 13, 14, 15, 19, 20–44, X–3–44 (C. B. Eaton) 9 fourth instar exuviae (reared from eggs). MISSISSIPPI: Hattiesburg, IV–6–43, 4.

Psorophora (Janthinosoma) longipalpis, new species

Aedes horridus Dyar and Knab, 1908, Proc. U. S. Nat. Mus. 35:56 (in part).

Psorophora horridus (Dyar and Knab): Howard, Dyar and Knab, 1917, Mosq. No. and Cent. Amer. and W. I., 2:561 (in part).

Psorophora (*Janthinosoma*) *horridus* (Dyar and Knab): Dyar, 1922, Proc. U. S. Nat. Mus., 62:36 (in part); Matheson, 1934, Proc. Ent. Soc. Wash. 36:41–43 (describes male).

Psorophora (*Janthinosoma*) *horrida* (Dyar and Knab), Rozeboom, 1939, Jour. Para., 25:145–147 (describes larva).

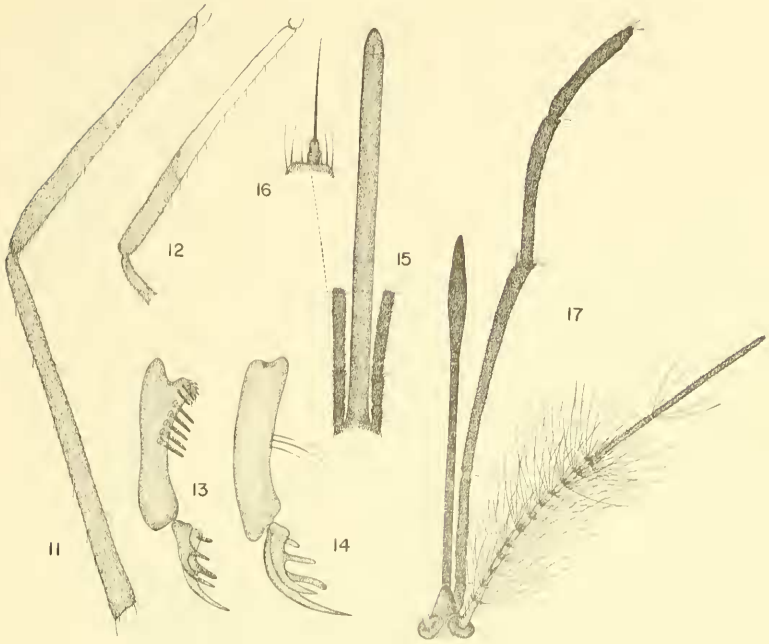
Psorophora horrida (D. and K.), King, Bradley and McNeel, 1942, USDA, Misc. Pub. 336:51, 79 (in part; use Rozeboom's larval description); Rozeboom, 1942, Oklahoma Agr. and Mech. Col. Agr. Exp. St. Technical Bulletin No. T–16:45.

Holotype Male.—Head: Proboscis long, slender, uniformly dark-scaled, with a distinct apical swelling, labellae long and conical. Palpi (Fig. 17) longer than proboscis, with dark appressed scales, the last two segments little, if any, enlarged; third segment with a few long bristles at the apex, penultimate and terminal segments without long setae. Antennae (Fig. 17) reaching well beyond

[5] The parentheses indicate that these specimens were among Dyar and Knab's original cotype material and the figure shows the number present. The total number of specimens examined, other than this cotype material, is not shown although several hundred have been seen.

the apex of the third palpal segment; last two antennal segments elongated, both longer than the preceding segments combined; hairs of whorls numerous (but distinctly fewer than in *P. horrida*) and long; tori dark, globose and with a patch of pale scales on the inner side; vertex clothed with both lanceolate and broad recumbent white scales and some pale and dark erect forked scales; a patch of flat violet-black scales on each side flanked on top by broad recumbent white scales and broad yellowish ones on bottom; recumbent pale scales along margin of eye narrow; frontal setae pale and long, ocular and vertical setae dark. *Thorax:* Mesonotum with a broad median band of narrow bronzy-brown scales and short dark setae; sides with very broad, flat white scales and long, mostly dark, setae; a few broad white scales, medially on the antescutellar area. Scutellum trilobate, clothed with pale scales, the lobes with long black bristles. Pleural sclerites and coxae as described later for the female. *Legs: Prothoracic leg:*—outer surface of femur with some yellowish scales basally, remainder violet-scaled; inner surface with yellowish scales running the entire length; femoral knee spot absent; tibia and tarsus with dark appressed scales and very few short suberect bristles; last tarsal segment (Fig. 13) scaled and setose, narrowed medially with a small basal projection on the posterior margin, bearing numerous small pointed scales and some large spines; a row of several large stout spines on the basal half along the posterior margin; large tarsal claw with a small basal and larger medial tooth; smaller claw with a long medial, tapered, apically rounded tooth. *Mesothoracic leg* (Fig. 11):—femur violet-scaled on outer surface, inner with some yellowish scales extending to the apex; femoral knee spot absent; tibia with dark recumbent scales and some very short suberect setae (no long bristles); tarsus with dark appressed scales; last tarsal segment (Fig. 14) scaled and setose, nearly of equal width throughout, with some long hairs arising from enlarged tubercles, about the middle of the posterior margin; large tarsal claw with a small basal, apically-rounded tooth and a larger medial one; smaller tarsal claw with a long medial tooth (one specimen lacked this medial tooth on the smaller claw). *Metathoracic leg*:—femur with about the basal half of the inner and outer surfaces yellowish-scaled, remainder violet; femoral knee spot absent; tibia with dark scales little roughened, and some some short suberect setae; last two tarsal segments and sometimes tip of third, white-scaled; dark suberect scales on first two segments, only slightly roughened, plus some short erect setae (the hind legs appear much less shaggy than *horrida*); both tarsal claws about equal in size and each with a medial, basally broad and apically pointed, tooth. *Abdomen:*—dorsum almost entirely violet-blue-scaled, a few apical lateral pale scales. Sternites nearly entirely yellow-scaled, except for the entire eighth and the basal medial part of the seventh segments which are violet-scaled. Bulbous sidepieces of the genitalia covered with violet scales and long pale setae.

Male Hypopygium (partly after Matheson, 1934) (Fig. 2):—*Sidepiece* cylindrical, short, stout at least half as wide as long with long and short setae and numerous recumbent and suberect scales; apex with a stout finger-like process projecting medially and clothed with slender hairs; inner face of each sidepiece with a large depression for housing the claspettes. *Clasper* short, narrowed at base and gradually expanded and rounded distally, terminating in a short spine; surface only slightly rugose; a small projection bearing several short setae on the



Figs. 11–17, *Psorophora longipalpis* n. sp. adult characters (drawn to same scale as Figures 3–9). 11, Femur (without knee spot) and tibia (without numerous long setae) of mesothoracic leg of male; 12, Metathoracic femur (without knee spot) of female; 13, Last tarsal segment and tarsal claws of prothoracic leg of male (scales and majority of setae not indicated); 14, Last tarsal segment and tarsal claws of mesothoracic leg of male (scales and majority of setae not indicated); 15, Palpi and proboscis of female; 16, Tip of last palpal segment (greatly enlarged) of female. 17, Antenna, proboscis and palp of male.

outer margin below the tip. *Claspettes* each with two divergent branches terminating in a long comparatively stout recurving spine; the larger branch with a small extension bearing two spines and numerous short slender setae and small flattened leaflets on and around the extension; the smaller branch with a slight projection, at the base bearing a short spine. *Mesosome* cone-shaped, open ventrally closed almost entirely dorsally, with a narrow marginal flange around the small basal opening. *Tenth sternites* with lateral supporting sclerotized strips ending in a short denticle. *Ninth segment* narrowed and retracted largely within the eighth. *Lobes of ninth tergite* projecting medially, without setae, the apical margin invaginated and sometimes bearing a central tooth-like projection; basally the lobes give off lateral projections which converge to form a dark band down the center. *Ninth sternite* with a medial area bearing a group of slender setae on the posterior margin.

Female:—Head: Proboscis dark-scaled, long and slender, almost uniform in width, labellae long and conical. Palpi (Fig. 15) comparatively long, dark-scaled, roughened, setose, the fourth segment elongated, and more than one and

one-half times longer than the preceding segments combined; sides of segment four parallel, of uniform width throughout (clearly seen in KOH treated specimens) and roundly truncate at tip; tip of fourth segment usually with a small setose projection which may or may not bear a long bristle (Fig. 16). Antennae slender, segments pilose, hairs of whorls, sparse and long; tori globose with a patch of flat pale scales on the inner surface. Vertex with both broad and narrow recumbent white scales, a patch of broad flat violet scales on the sides flanked by broad flat white or creamy scales on top and broad yellowish-white scales on bottom; white erect forked scales, numerous over a large area, some dark ones usually restricted to the occipital region; scales along margin of eye mostly narrow and recumbent; frontal setae pale, ocular and vertical setae dark. *Thorax:*—Mesonotum black with a broad median band of narrow dark bronzy-brown scales and a few short dark setae; sides with broad flat white to yellowish scales; supraalar setae long and dark; lanceolate pale scales intermixed with the broad ones at the posterior third of the mesonotum; some broad pale scales and long dark setae, surrounding the antescutellar area. Scutellum trilobate, the lobes with long black bristles and pale scales. Anterior and posterior pronotal lobes with long dark setae and a few broad pale scales; postspiracular plate with a few pale scales and setae; subspiracular area wide, sometimes a few pale scales; sternopleural and mesepimeral plates with nude apical regions the remainder covered with broad recumbent white scales; propleural plate with broad flat white scales; meron, nude and dark. *Legs: Prothoracic leg:*—Integument of coxa yellow with a dense patch of broad white scales and pale setae; outer surface of femur with yellow scales basally, remainder violet-scaled; inner surface with yellow scales reaching apex; suberect setae numerous; femoral knee spot absent; tibia and tarsus with dark scales and suberect setae. *Mesothoracic leg:*—Integument of coxa brown with pale scales apically and violet scales basally (rarely all pale-scaled); outer surface of femur violet-scaled with yellow scales reaching almost to the apex on the inner surface; femoral knee spot absent; tibia and tarsus with dark scales and suberect setae. *Metathoracic leg:*—Integument of coxa yellow, nearly nude with a few yellowish scales and setae; femur with yellow scales reaching the apical third (both surfaces); femoral knee spot absent (Fig. 12); tibia and first three tarsal segments dark-scaled, roughened, last two segments and sometimes the tip of the third white-scaled. The fourth hind tarsal segment may rarely have some dark scales intermixed with the white scales. *Abdomen:*—Dorsum of first segment yellow-scaled, the other segments violet-scaled with small yellowish lateral apical patches distinct on segments four to six (sometimes seven); sternite of segment seven dark, the others mostly yellow-scaled except for some dark ones basally on segment six and sometimes five.

Larva (largely after Rozeboom, 1939) (Fig. 18):—Head broader than long, bulging laterally. Antennae spinulate, curved, somewhat swollen basally and tapering distally, longer than head; a small multiple tuft (5 to 7 branches) beyond the middle; one short and 3 long spines at the tip. Upper and lower head hairs double, long, the tips reaching to or beyond the preclypeus. (In the two specimens seen, one branch on each head hair was shorter and more slender than the other). Antennal, preantennal, and head hairs with very fine, short lateral branchlets.

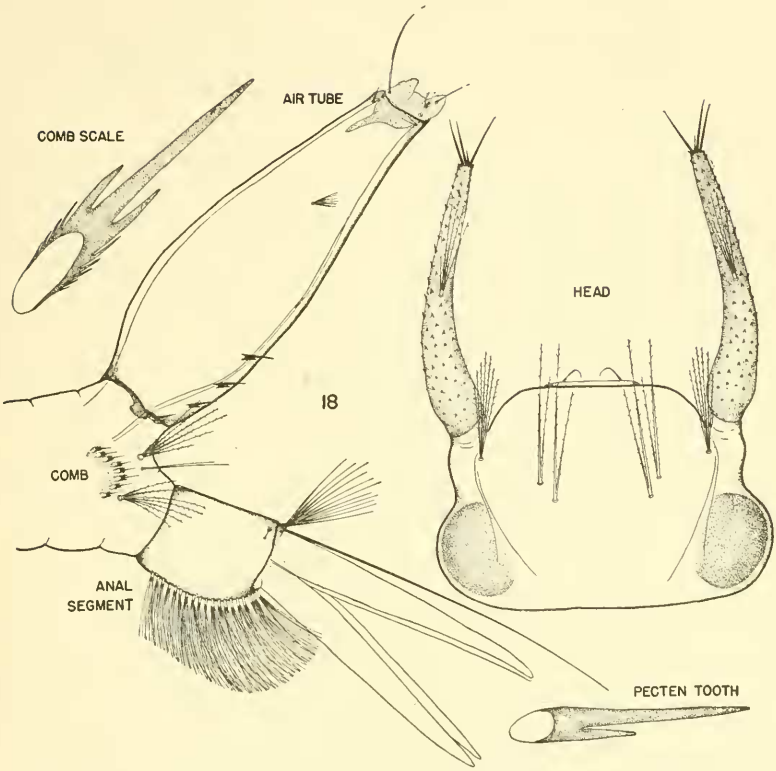


Fig. 18, *Psorophora longipalpis* n. sp. fourth instar larval characters (drawn to same scale as Figure 10).

Lateral abdominal hairs multiple; long on first two segments and shorter on succeeding segments. On segment III these hairs have 3 to 7 branches, while on segments IV ,V and VI, they have 3 to 5, rarely 2, branches.

Comb scales of eighth abdominal segment seven in number, arranged in an arc at the posterior edge of a weakly sclerotized plate. Each scale has a long central spine flanked on each side by 1 or 2 smaller, stout ones; several more slender spinules below the stout ones, on each side. Posterior to the comb scales are 3 hairs, the outer 2 multiple (with branches frayed) and the middle one double or single (without lateral branchlets).

Air tube inflated, about 3 or more times as long as the width at the base, with 3 or 4 short pecten spines on the basal third; a very small, multiple ventral tuft laterally on about the apical third; branches of the ventral tuft very fine and may be as long as a pecten tooth; dorsal preapical spine about one-third the length of a pecten tooth; dorsal apical hair about 6 or more times as long as the dorsal preapical spine; other apical hairs (ventral) consisting of 2 long single hairs and a shorter multiple pair.

Anal segment longer than wide, ringed by plate; ventral brush consisting of 19 or 20 (2 specimens) tufts which pierce the plate along the mid-ventral line. Dorsal brush a long hair and a multiple tuft on each side. Lateral hair very small, usually split apically into several branches, but occasionally it may be single. Anal gills long and tapering.

Rozeboom (1939) records some observations regarding the habits of *longipalpis*. The larvae breed in heavily shaded, temporary rain pools. None were taken in nearby puddles exposed to the sun. Other species associated in the same pools with *longipalpis* were *Psorophora confinnis*, *P. signipennis*, *P. cyanescens*, *P. ferox*, *Aedes vexans*, *A. trivittatus*, and *Anopheles punctipennis*. Except for *ferox*, *longipalpis* appeared to breed a little more slowly than the other species.

Holotype: Male (terminalia on slide), Fayetteville, Arkansas, August 24, 1933 (H. H. Schwardt) deposited in the U. S. National Museum.

Paratypes: KANSAS: Parsons, Labette Co., VI–2–43, 1 female. MISSOURI: Atherton, Jackson Co., June (C. F. Adams), 1 female; Rosecrans Field, Buchanan Co., VI–23–44 (C. E. Norland) 3 females. OKLAHOMA: Dawson, V–15–44, 3 males, 3 females; Tulsa, VIII–1–38 (Rozeboom) 1 male (terminalia on slide), 2 females; Henryetta, VI–28–34 (C. A. Sooter), 2 females. SOUTH DAKOTA: Springfield, VI–25–24, 1 male (terminalia on slide), VI–27–24, 1 female. TEXAS: Bastrop Co., VI–1–44, 1 female; Brazos Co., VIII–3–43, 1 male; Brownsville, VIII–29–16 (M. M. High), 8 females, VIII–30–16 (M. M. High) 1 female; Harris Co., VIII–6–43 (Ogden), 6 females, XI–1–39, 1 female; Victoria, VIII–13–02 (W. E. Hinds), 5 females, VI–11–07 (R. A. Cushman), 8 females, VI–14–07 (J. D. Mitchell), 7 females.

The following specimens were among Dyar and Knab's original cotypes (No. 11999) and all are from TEXAS: Cypress Bayou, Orange Co., VIII–23–03 (J. D. Mitchell), 1 female; Dallas, VI–28 (H. S. Barber), 1 female; Denison, VI–24 (H. S. Barber), 3 females; Greenville, VI–30–04 (H. S. Barber), 2 females.

All but the following specimens are deposited in the United States National Museum: 1 male, 7 females in the Laboratory of the Texas State Board of Health; 1 male and 1 female at Cornell University; 3 females at the Seventh Service Command Laboratory, Fort Omaha, Nebraska; 1 female at the University of Kansas; 1 female at the Oklahoma A. and M. College; 3 males and 3 females at the Oklahoma State Health Department, Oklahoma City, Oklahoma.

Discussion

In spite of the fact that the genitalia of *horrida* and *ferox* are similar, the larval and adult (color) differences are so constant

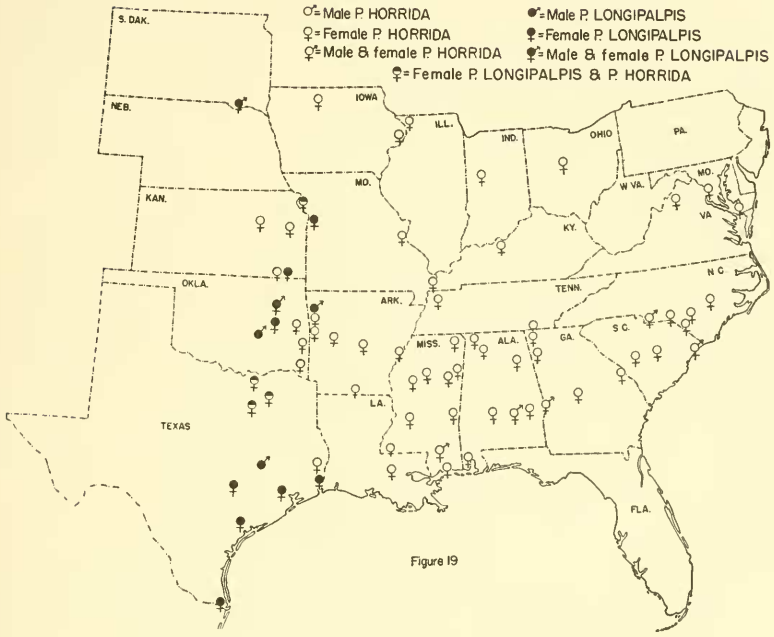


Fig. 19, Map showing the distribution of *Psorophora longipalpis* n. sp. and *Psorophora horrida* (D. and K.), based on an examination of males and females of both species. (The five males of *P. horrida*, from Tulsa County, Dawson, Oklahoma, were received too late to be included in the map).

that both should remain as distinct species. It is not unusual to find two different species with similar male genitalia. *Psorophora confinnis* (L.-Arr.) and *P. discolor* (Coq.) are easily separated by color yet their male genitalia are very similar, and examples of species with genitalia similarities and color differences are found in other genera.

In general *longipalpis* is a larger and more robust species (adults and larvae) than *horrida*. The chief differences between these two species are summarized in Table 1. *Longipalpis* females can be separated at once from *horrida* by the absence of femoral knee spots, longer palpi (particularly the elongated fourth palpal segment), and the greater amount of yellow scales on the abdominal sternites. The males of the two species are separated not only by the remarkably different genitalia (*longipalpis* may be recognized macroscopically by their bulbous sidepieces; Rozeboom, 1939) but by the differences in palpi, antennae and legs, as described in the text and Table 1. The

larvae of *horrida* can be distinguished from both *longipalpis* and *ferox* by their short antennae and short head hairs. *Longipalpis* is separated from *ferox* by the multiple lateral abdominal hairs on segments IV to VI. These are double on segment IV and single on V and VI, in *ferox*. Although the base of the antenna of *longipalpis* is apparently slightly more swollen than in *ferox*, Rozeboom (1939) believes that this character is not a satisfactory one.

Unfortunately the records of *P. longipalpis* are scarce and for this reason the known distribution of this species as shown in Figure 19 is spotty. The records for *P. horrida* however are fairly complete, particularly for the southeastern states. Based on examinations of male and female specimens, Figure 19 shows the distribution of both species. *Horrida* is predominantly an eastern species while *longipalpis* appears to be a midwestern form and from available specimens, has not been recorded farther east than Atherton, Missouri, Fayetteville, Arkansas, and Orange County, Texas. However *horrida* has been taken as far west as Fort Riley, Kansas, and Denison and Dallas, Texas. This has resulted in an area where both species overlap. Further collections are necessary in these midwestern states before an exact distribution picture can be drawn.

Psorophora horrida has not been recorded from Montana (Mail, 1934), Nebraska (Tate and Wirth, 1942; Tate and Gates, 1944), Minnesota (Owen, 1937) and Utah (Rees, 1943). Records of *P. horrida* taken from available literature are as follows:

LOCALITY	AUTHORITY
INDIANA—	
Dyar, Clark Co.; Marion Co.; Vigo Co..	Christensen and Harmston (1944)
IOWA—	
Schick General Hospital.....	Seventh S. C. Laboratory
Des Moines; Follets [7], Clinton Co.; Dubuque, Dubuque Co.; Shenandoah, Page Co.; Ames, Story Co.; Washington, Washington Co.; Sioux City, Woodbury Co.	Rowe (1942 a, b)
KANSAS—	
Antlers, Alva, Byars, Blue, Checotah, Durant, Eagletown[7], Goodland, School, Grant, Golden Gore[7], Henryetta[6], Hugo, Moon, Nelson, Perkins, Ripley Bluffs, Shawnee[6], Stillwater, Summerfield, Sawyer, Sherwood [7], Tulsa [6, 7], Valliant, Westville.	Rozeboom (1942)
Atchinson Co.; Manhattan.....	Hill (1939)
Concordia POW Camp; Camp Dodge; Fort Leavenworth.	Seventh S. C. Laboratory

TABLE 1.—Chief differences between males, females and larvae of *P. horrida* (D. & K.) and *P. longipalpis*, n. sp.

	Structure	*Psorophora longipalpis*, new species		*Psorophora horrida* (D. & K.)	
		Male	Female	Male	Female
ADULT..	Palpi.....	Last two segments about same width as previous ones; no long bristles on penultimate segment (Fig. 17).	Terminal segment more than 1.5 times longer than the preceding segments combined (Fig. 15).	Last two segments distinctly enlarged, the penultimate segment with long bristles (Fig. 9).	Terminal segment little, if any, longer than the preceding segments combined (Fig. 7).
	Antennae..	Comparatively lightly feathered; torus with a patch of pale scales on inner surface (Fig. 17).		Heavily feathered; torus nude. (Fig. 9).	
	Legs.....	Femoral knee spots absent; mid- and hind-tibiae without long setae (Fig. 11); tarsal claws of fore and mid legs as in Figures 13 and 14.	Femoral knee spots absent (Fig. 12); hind coxae nearly nude with only a few dispersed yellow scales.	Femoral knee spots present; mid- and hind-tibiae with numerous long suberect setae (Fig. 3); tarsal claws as in Figures 5 and 6.	Femoral knee spots present (Fig. 4); hind-coxae with a basal patch of white scales.
	Abdomen..		Majority of sternites largely yellow-scaled.		Majority of sternites with basal portion violet-scaled, apical portion yellow.
	Genitalia..	Figure 2.....		Figure 1.....	
LARVA.	Head.....	Antennae longer than head; upper and lower head hairs long, reaching beyond the preclypeus (Fig. 18).		Antennae shorter than (rarely as long as) head; head hairs short, not reaching the preclypeus (Fig. 10).	
	Air Tube..	Dorsal apical hair 6 to 7 times longer than dorsal preapical spine (Fig. 18).		Dorsal apical hair about 1.5–2.0 times length of dorsal preapical spine (Fig. 10).	

LOUISIANA—	
Baton Rouge [7]; Camp Claiborne, Rapides Parish; Leesville, Vernon Co.	Bradley, Fritz and Perry (1944)
MISSOURI—	
Camp Clark; Jefferson Barracks [7]; Fort Leonard Wood.	Seventh S. C. Laboratory
Spanish Lake; Creve Coeur Lake; Gumbo; Wicks; Columbia; Acres.	Adams and Gordon (1943)
NEBRASKA—	
Fort Omaha.....	Seventh S. C. Laboratory
SOUTH CAROLINA—	
Columbia [7], Richland Co.....	Bradley, Fritz and Perry (1943)
TEXAS—	
Southeastern part of state [6], [7].....	McGregor and Eads (1943)

The South Carolina and Indiana records are probably *horrida*. Practically all (see footnotes 6 and 7) of the other records were taken from regions where both species may possibly occur and therefore these should be considered doubtful until specimens from these localities are re-examined.

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[6] Specimens seen from these localities have been *longipalpis*. The positive male records from Shawnee (Fig. 19) are based on Rozeboom's description of specimens seen near Shawnee on July 11, 1940. He states "even in their resting places the males could be identified by the bulbous terminalia." These were undoubtedly *longipalpis* since *horrida* males do not have bulbous terminalia.

[7] Specimens examined from these localities have been *horrida*.

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